NORMA SMITH

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 22, 2006

MEMO TO: Don Lee, Berry Jenkins, Michael Taylor, Don Bernhoft, Jay Bennett, Shannon Sweitzer, Judith Corley-Lay, Stuart Bourne, Jonathan Bivens, Jennifer Brandenburg, Brian Webb, Dave Rankin and Dave Hurley

FROM: J. V. Barbour, P. E.
State Project Services Engineer

SUBJECT: AGC/Roadway Subcommittee Meeting Minutes
February 22, 2006

The subject committee met on February 22, 2006 at 10:00 a.m. in the Riverwood Conference Room at the Century Center with the following in attendance:

Victor Barbour	Charlie Brown	Ellis Powell
Jay Bennett	Dennis Jernigan	Greg Crowder
Don Bernhoft	David Harris	Mike Bowen
Jonathan Bivens	Berry Jenkins	Michael Taylor
Judith Corley-Lay	Watson McNeil	

The following items were discussed:

1. **CONSTRUCTION SURVEYING AND CONSTRUCTION SURVEYING UTILITY INVESTIGATIONS**

The Department has been including Construction Surveying by contract on selected projects for over 10 years. In the past 5 years Construction Surveying has been included as a contract item on just about every major project. The continued use of Construction Surveying has raised several concerns from contractors as well as surveyors who are performing this work. Some of the concerns are:

- What constitutes the difference between an adjustment in the field and a design change?
- What constitutes extra work and payment for Supplemental Surveying?
- Utility Investigations – this revolves around the payment or non-payment of pot holing to locate utilities and also the increasing tendency for there to be new or unknown utilities in the right of way that are not shown on the plans.
- The ties in of projects at the beginning and end as well as Y-line tie ins.
- The amount of surveying needed at Borrow Pits to accurately determine quantities.

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LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

- Liability Issues – Who is responsible for design changes made in the field? This is especially true when there are major hydraulic changes made trying to avoid utilities.
- Consistency – getting the same answers regarding payment for extra work and for payment for Supplemental Surveying.
- Time – the amount of time it takes to make and get approval for adjustments.

Taking all these things into account and since the specifications have not been examined thoroughly since we began using it, the committee felt that we should form a Task Force to examine these concerns and see what changes may be warranted. It was felt that the membership of the committee should be contractors, surveyors who are performing the work, Resident Engineers, Division Construction Engineers, Location & Surveys, Roadway Design, Hydraulics, Project Services and the Construction Unit. The contractor representatives are Michael Taylor, Jonathan Bivens, and Dave Hurley with surveyor representatives Greg Crowder and Phillip Post. The first meeting will be scheduled in the near future.

2. EROSION CONTROL CERTIFICATION PROGRAM

With the Department's implementation of the Erosion Control Certification Program several concerns have been raised about the levels of responsibility for determining the adequacy of the erosion control features installed on a project, the testing procedures currently being used, and the cost associated with the use of the program.

One of the major goals of the program is to raise awareness and knowledge of the proper use and implementation of erosion control features to the personnel in the field who are performing the work. The Department feels that proper erosion control is a shared responsibility between the Department, contractors, and subcontractors performing work on a project and the liabilities associated with that goes to everyone. Also one of our goals is to get it "right" the first time. The Department has reviewed the project special provision being used and have made some revisions to hopefully address this concern (copy attached).

There was a concern expressed about some of the questions being asked in the test for certification whether they were appropriate for the audience being tested. One of the concerns from the industry from the beginning has been having some of their best and most experienced personnel unable to pass the test. The Department will take a look at this to make sure that the questions being asked are appropriate.

While the Department is aware there is a cost associated with the program we hope that this cost will be offset by lower cost during construction with better functioning erosion control during the project.

3. ALTERNATIVE PAVEMENT DESIGNS

The Department will begin providing for an alternate bid between aggregate base course and black base on selected projects. The goal is provide bidders with an opportunity to make the best economic decision on what materials to be used to construct a project. A copy of the project special, the design manual revision, and an earthwork summary were distributed showing how we proposed to show the alternate. (copies attached)

4. **PIPE ALTERNATES**

The Department will begin providing with the June 20, 2006 letting an alternate bid item for the use of Class III reinforced concrete pipe, HDPE pipe and aluminized corrugated steel pipe. A copy of the special provision is attached.

5. **EARTHWORK BALANCE ON PROJECTS**

With the increasing difficulty in finding suitable borrow material and for waste areas in close proximity to projects the industry reiterated the need for the Department to make every attempt to balance earthwork on projects to the greatest extent possible. The Department recognizes this and strives to balance earthwork within the constraints of a project.

6. **OVERRUNS AND UNDERRUNS ON MINOR ITEMS**

The industry expressed a concern over the 100% threshold for price adjustments for minor items. This has had an effect on subcontractors in particular since a lot of these items are performed by them. The 100% threshold is a national standard and the Department is unaware of any states who have changed that threshold. We will discuss this further at the next meeting.

7. **MEETING DATES UPDATE FOR 2006**

The next meeting will be April 19, 2006 at 10:00 a.m. in the Riverwood Conference Room (formerly called Project Services Large Conference Room). The remaining meeting dates for 2006 are:

June 28	October 18
August 16	December 20

You may want to reserve all day for the meeting in case it runs long, or there is a need to make a field trip in the afternoon.
JVB:JG
Attachments

cc: Steve DeWitt, PE
Art McMillan, PE
Randy Garris, PE
David Harris, PE
Ellis Powell, PE
Charlie Brown, PE
Norma Smith

COMPUTED BY: B. YOPP DATE: SEPT 2006
CHECKED BY: T. BURNS DATE: SEPT 2006

PROJECT REFERENCE NO. [illegible] SHEET NO. [illegible]

METRIC

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
SUMMARY OF EARTHWORK
IN CUBIC METERS

LOCATION	UNCL. EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
SUMMARY NO. 1					
-L- 11+98.805 TO 19+00.000	179,830		2,638		177,192
-Y- 10+00.000 TO 13+40.000	3,850		554		3,296
-Y1- 10+00.000 TO 12+26.533	1,395		581		814
-Y1- 13+03.733 TO 14+20.000	507		107		400
-Y1 DET- 10+29.365 TO 14+16.948	2,827		4,504	1,677	
DETOUR REMOVAL			1,477	1,477	
SUMMARY NO. 1 TOTAL	188,409		9,861	3,154	181,702
SUMMARY NO. 2					
-L- 19+00.000 TO 26+17.519 L.B.	24,365		145,723	121,358	
SUMMARY NO. 2 TOTAL	24,365		145,723	121,358	
SUMMARY NO. 3					
-L- 25+77.880 L.A. TO 35+00.000	174,860	1,300	107,286		68,874
-Y2- 10+00.000 TO 13+07.000	5,013		6,870	1,857	
-Y2- 14+20.000 TO 17+39.078	768	600	23,555		600
SUMMARY NO. 3 TOTAL	180,641	1,900	137,711	1,857	69,474
SUMMARY NO. 4					
-L- 35+00.000 TO 44+00.000	343,420		35,086		308,334
-Y3- 10+00.000 TO 12+26.944	1,633		971		662
-Y3- 13+02.264 TO 14+54.746	1,097		690		407
-Y4- 10+00.000 TO 16+55.785	4,324		26,150	21,826	
-DET2- 12+37.210 TO 15+52.083	5,014		451		4,563
-DET3- 12+51.082 TO 12+95.313	84		0		84
SUMMARY NO. 4 TOTAL	355,572		63,348	21,826	314,050
SUMMARY NO. 5					
-L- 44+00.000 TO 53+00.000	422,416	9,200	43,889		378,527
-Y5- 10+00.000 TO 19+45.115	5,219	800	970		5,049
-RPB- 11+53.455 TO 15+26.124	21,810		27,978	6,168	
-RPC- 11+94.366 TO 14+94.366	543		32,014	31,471	
-LPB- 10+67.281 TO 12+51.310	0		62,292	62,292	
-LPC- 10+43.870 TO 12+30.352	5,399		30,923	25,524	
-FLY- 12+76.258 TO 18+50.963	45,289		151,585	106,296	
SBCD -Y6- 13+38.426 TO 20+85.589	12,910		17,308	4,398	
SBCD -Y6- 21+69.189 TO 28+00.000	25,899		47,316	21,417	
SBCD -Y6- 28+00.000 TO 36+00.000	25,504		47,426	21,922	
SBCD -Y6- 36+00.000 TO 45+00.000	9,727		106		9,621
SBCD -Y6- 45+00.000 TO 49+70.000	1,887		419		1,468
SUMMARY NO. 5 TOTAL	576,603	10,000	462,226	279,488	403,865

LOCATION	UNCL. EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
SUMMARY NO. 6					
-L- 53+00.000 TO 61+00.000	25,225		196,495	171,270	
-RPA- 11+14.406 TO 14+23.096	0		96,372	96,372	
-RPD- 11+30.762 TO 14+87.240	35,027		10,250		24,777
-LPA- 10+34.440 TO 12+28.790	0		56,563	56,563	
-FLY- 20+12.663 TO 21+45.365	48		57,430	57,382	
-FLY- 22+45.365 TO 27+05.599	29,011		124,396	95,385	
NBCD -Y6- 13+27.416 TO 20+92.218	28,094		11,202		16,892
NBCD -Y6- 21+75.818 TO 28+00.000	36,786		40,392	3,606	
NBCD -Y6- 28+00.000 TO 37+00.000	55,825		35,752		20,073
NBCD -Y6- 37+00.000 TO 45+80.000	10,026		632		9,394
SUMMARY NO. 6 TOTAL	220,042		629,484	480,578	71,136
SUMMARIES TOTAL	1,545,632	11,900	1,448,353	908,261	1,040,227
ADDITIONAL UNDERCUT		+7,000	+8,400	+8,400	+7,000
REDUCT. DUE TO CLEAR. & GRUB.	-15,000				-15,000
ROCK WASTE IN LIEU OF BORROW				-13,524	-13,524
ADJUSTMENT FOR ROCK WASTE			-2,705	-2,705	
PROJECT TOTAL	1,530,632	18,900	1,454,048	0	118,271
SAY	1,530,650				118,300

EARTHWORK TOTALS FOR ALTERNATE PAVEMENT DESIGN

LOCATION	UNCL. EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
SUMMARIES TOTALS (FROM ABOVE)	1,545,632	11,900	1,448,353	908,261	1,040,227
ADJUST. FOR ALT. PAV'T DESIGN	-16,000		+10,122	+10,122	
ADDITIONAL UNDERCUT		+7,000	+8,400	+8,400	+7,000
REDUCT. DUE TO CLEAR. & GRUB.	-15,000				-15,000
ROCK WASTE IN LIEU OF BORROW				-13,524	-13,524
SUIT. WASTE IN LIEU OF BORROW				-910,554	-910,554
ADJUSTMENT FOR ROCK WASTE			-2,705	-2,705	
ALTERNATE PAV'T DESIGN TOTAL	1,514,632	18,900	1,464,170	0	108,149
SAY	1,515,000				108,200

ALTERNATE BASE MATERIAL:

The Contractor's attention is directed to the fact that this proposal contains a pavement design alternate. As required by the Standard Specifications the bidder shall submit bids for only one pavement design alternate. Substitution for the selected alternate will not be allowed during construction.

PAVEMENT ALTERNATE BASE COURSE MATERIALS 1-3F

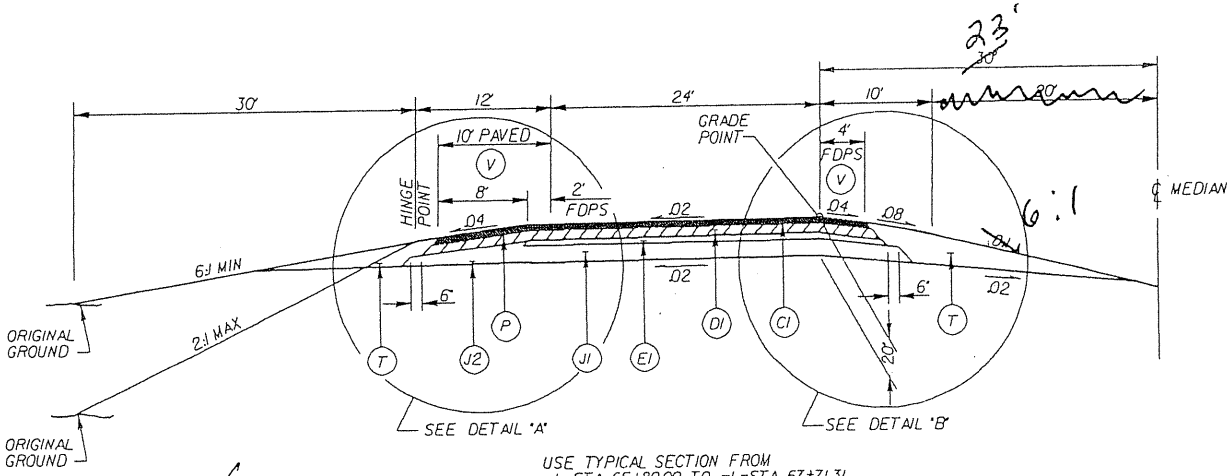
Some major new location and existing two lane facilities widened to four lanes will require alternate base course materials. The alternate base course recommendation will allow the contractor the choice to construct either a pavement with aggregate base course or asphalt concrete base course. The Pavement Management Unit will select which projects require alternate base course materials and specify these bases in the pavement design recommendations sent to the Roadway Design Unit.

The roadway typical sections should show the aggregate base course design. Details or insets should supplement the typical sections showing the asphalt concrete base course alternate. (See 1-3F, FIGURE 1). The Pavement Management Unit will furnish the applicable shoulder drain designs for each alternate design. When coordinating with other units, specify that all work related to Geotechnical Engineering, Hydraulics and Utilities be performed assuming the aggregate base course alternate will be constructed.

Earthwork quantities are required for both alternates. Plans will include a separate earthwork summary for each alternate. Furnish the Geotechnical Engineering Unit balance sheets for both alternates to use in preparing subsurface plans. Use aggregate base course alternate to prepare cross sections with a note on the cross section summary sheets as follows:

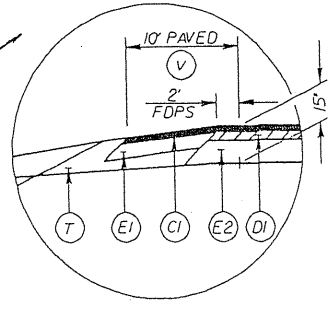
"The cross sections reflect aggregate base course alternate."

Any pay item quantities affected by the alternate base course materials should be computed and shown on the estimate within the alternate in which they apply. Some possible pay items required to be shown within each alternate are unclassified excavation, borrow excavation (borrow projects), aggregate base course, asphalt concrete, asphalt binder, prime coat and shoulder borrow (waste projects).

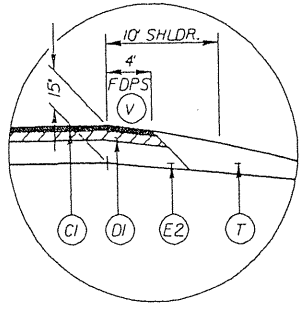


USE TYPICAL SECTION FROM
-L-STA. 65+80.00 TO -L-STA. 67+71.31

SAMPLE



ALTERNATE PAVEMENT DESIGN
DETAIL 'A'



ALTERNATE PAVEMENT DESIGN
DETAIL 'B'

DRAFT

	PAVEMENT SCHEDULE
C1	PROP. APPROX 3" ASPHALT CONCRETE SURFACE COURSE. TYPE S9.5B AT AN AVERAGE RATE OF 168 LBS. PER SO YARD IN EACH OF TWO LAYERS.
D1	PROP. APPROX 4" ASPHALT CONCRETE INTERMEDIATE COURSE. TYPE I19.0B AT AN AVERAGE RATE OF 456 LBS. PER SO YARD.
E1	PROP. APPROX 5" ASPHALT CONCRETE BASE COURSE. TYPE B25.0B AT AN AVERAGE RATE OF 570 LBS. PER SO YARD.
E2	PROP. APPROX 8" ASPHALT CONCRETE BASE COURSE. TYPE B25.0B AT AN AVERAGE RATE OF 456 LBS. PER SO YARD. IN EACH OF TWO LAYERS.
J1	PROP. APPROX 8" AGGREGATE BASE COURSE.
J2	PROP. VARIABLE DEPTH AGGREGATE BASE COURSE.
P	PRIME COAT AT THE RATE OF 0.35 GALLONS PER SO YARD.
T	EARTH MATERIAL
V	RUMBLE STRIP

PIPE ALTERNATES:

06-20-06
(Draft 03/21/06)

Description

The Contractor may substitute Aluminized Corrugated Steel Pipe, Type IR or HDPE Pipe, Type S or Type D up to 48 inches in diameter in lieu of concrete pipe in accordance with the following requirements.

Material

Item	**Section**
HDPE Pipe, Type S or D	1044-7
Aluminized Corrugated Steel Pipe, Type IR	1032-3(A)(7)

Aluminized Corrugated Steel Pipe will not be permitted in counties listed in Article 310-2 of the *Standard Specifications*.

Construction Methods

Aluminized Corrugated Steel Pipe Culverts and HDPE Pipe Culverts shall be installed in accordance with the requirements of Section 300 of the *Standard Specifications* for Method A, except that the minimum cover shall be at least 12 inches. Aluminized Corrugated Steel Pipe Culvert and HDPE Pipe Culvert will not be permitted for use under travelways, including curb and gutter.

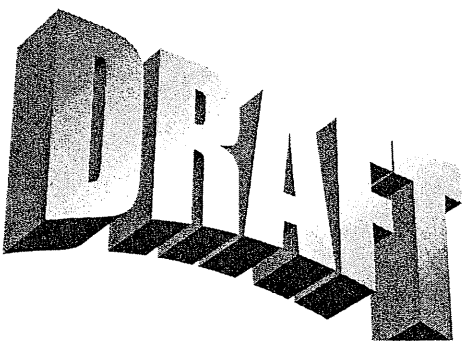
Measurement and Payment

The quantity of ____ "*Aluminized Corrugated Steel Pipe Culvert* to be paid for will be the actual number of linear feet installed and accepted. Measurement will be accordance with Section 310-6 of the *Standard Specifications*.

The quantity of _____ "*HDPE Pipe Culvert* to be paid for will be the actual number of linear feet installed and accepted. Measurement will be in accordance with Section 310-6 of the *Standard Specifications*.

Payment will be made under:

Pay Item	**Pay Unit**
___" Aluminized Corrugated Steel Pipe Culverts, ___" Thick	Linear Foot
___" HDPE Pipe Culverts	Linear Foot



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

February 24, 2006

Memorandum To: Steve Varnedoe, P.E.
Steve DeWitt, P.E.
Deborah Barbour, P.E.
Lacy Love, P.E.
Bill Rosser, P.E.

From: Len Sanderson, P.E.
State Highway Administrator

Subject: Pipe Material Alternates

In an effort to provide alternate material choices on projects it has been decided that beginning with the June 20, 2006 letting all projects shall include line item pipe material alternates covered by Section 310 of the Standard Specifications. The pipe material alternates to be included are Reinforced Concrete Pipe, Class III; HDPE smooth lined corrugated plastic pipe; or Aluminized Corrugated Steel Pipe, Type IR.

The alternate pipe materials to be used in lieu of concrete pipe shall be used in non live-load situations up to 48 inches in diameter. Non live-load situations is defined as those pipes which are not located under travelways including curb and gutter.

Please find attached a pay item sheet and drainage summary as an example of how to show the alternates in the estimate and plans. Also attached are the project special provisions that will need to be included in projects.

Again, this is to be effective with the June 20, 2006 letting. If you have any questions please contact Cynthia B. Perry, PE in the Plan Review Section of the Project Services Unit at 919-250-4128.

LAS/jvb

Attachments

cc: Art McMillan, P.E., State Highway Design Engineer
J.A. Bennett, P.E., State Roadway Design Engineer
D.R. Henderson, P.E., State Hydraulics Engineer
J.V. Barbour, P.E., State Project Services Engineer
R.A. Garris, P.E., State Contract Officer
C.B. Perry, P.E., Plan Checking Section Engineer
Division Engineers

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LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

HDPE PIPE ALTERNATE: 06-20-06

The Contractor may substitute Type S or Type D HDPE pipe in lieu of concrete pipe up to 48 inches in diameter, except that HDPE pipe will not be permitted for use under travelways, including under curb and gutter.

HDPE pipe material shall conform to the requirements of Subarticle 1044-7 and installation shall conform to the requirements of Section 300 of the Standard Specifications for Method A, except that the minimum cover shall be at least 12 inches (300 mm).

HDPE Pipe culvert will be measured and paid for as the actual number of linear feet (meters) installed and accepted. Measurement will be in accordance with Section 310-6 of the Standard Specifications.

Payment will be made under:

____" (mm) HDPE Pipe Culverts

ALUMINIZED CORRUGATED STEEL PIPE ALTERNATE:

The Contractor may substitute Aluminized Corrugated Steel Pipe, Type IR meeting the requirements of Article 1032-3(A)-7 of the Standard Specifications in lieu of concrete pipe up to 48 inches in diameter, except Aluminized Corrugated Steel Pipe, Type IR will not be permitted for use under travelways, including under curb and gutter.

Aluminized Corrugated Steel Pipe culvert material must conform to the requirements of AASHTO M36 and installation shall conform to the requirements of Section 300 of the Standard Specifications for Method A, except that the minimum cover shall be at least 12 inches (300 mm).

Aluminized Corrugated Steel Pipe culvert will be measured and paid for as the actual number of linear feet (meters) installed and accepted. Measurement will be in accordance with Section 310-6 of the Standard Specifications.

Payment will be made under:

____" (mm) Aluminized Corrugated Steel Pipe Culverts, ____" (mm) Thick

Subject: **MPLI Additions**
Date: Thu, 02 Mar 2006 10:35:46 -0500
From: Penny Higgins <phiggins@dot.state.nc.us>
Organization: North Carolina Department of Transportation
To: Jaci Kincaid <jakincaid@dot.state.nc.us> ,
Balaji Guptha <bguptha@dot.state.nc.us> ,
"David M. Alford" <dmalford@dot.state.nc.us> ,
"W. H. (Bill) Elam" <belam@dot.state.nc.us> ,
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Amy Clawson <aclawson@dot.state.nc.us> ,
Andy Whittaker <awhittaker@dot.state.nc.us> ,
"Barbara B. Benifield" <bbenifield@dot.state.nc.us>

The following items have been added to the 2006 Pay Item List:

0536000000-E SP ***" HDPE Pipe Culverts LF

0540000000-E SP ***" Aluminized Corrugated Steel Pipe Culverts, ***" Thick LF

RD223235

COMPUTED BY: TO, RPS DATE: 7/1/2004

CHECKED BY: REO, SMH DATE: 11/22/2004

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC | PROJECT NO. R-0967CC | SHEET NO. 3-B

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 1200mm & UNDER)

STATION	LOCATION (LT, RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 300	375	450	600	750		1050	1200	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) 300	400	450	600	800	900	1000	1200	CLASS III R.C. PIPE OR C.S. PIPE, TYPE IR ALUMINIZED OR HDPE PIPE, TYPE S OR D 375	450	600	750	900	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE
THICKNESS OR GAUGE																1.63	1.63	1.63	1.63	2.01	2.01	2.01	2.01								
L 158+51	RT	1		118.95																											
L 158+51	RT	1	2		117.62	117.50	X																		3.6						
L 158+51	LT	3																													
L 158+51	LT	4		119.55																											
L 158+51	CL	3	4		118.63	118.79				3.6																					
L 158+51	CL	4	5		118.79	121.95				91.2																					
L 159+45	CL	5		122.86																											
L 159+45	LT	5	6		122.02	122.92			26.4																						
L 159+60	LT	6		123.76																											
Y38 10+68	RT	7																											8.4		
L 161+39	RT	8	9		127.00	127.35																					22.8				
L 161+62	RT	9		129.32																											
L 161+62	RT	9	10		127.65	129.66				27.6																					
L 161+62	CL	10		130.57																											
L 161+62	LT	10	11		129.73	129.98			18.0																						
L 161+62	LT	11		130.82																											
L 162+79	RT	12																													
L 163+18	LT	13																													
L 163+18	LT	13	14		137.63	132.10													10.8												
L 163+18	LT	14		133.17																											
L 163+18	LT	14	15		132.1	131.84													18.0												
L 163+18	CL	15		132.91																											
L 163+18	RT	15	16		131.84	131.48													25.2												
L 163+54	LT	17																											8.4		
L 163+54	LT	18																											9.6		
L 163+54	CL	18A																													
L 163+89	RT	19																													9.6
L 164+39	LT	20		138.62																											
L 164+39	LT	20	21		137.71	137.45				18.0																					
L 164+39	CL	21		138.37																											
L 164+39	RT	21	22		137.30	137.00					26.4																				
L 165+66	RT	23	24		142.56	142.6																			3.6						
L 165+66	RT	24		144.50																											
L 165+66	CL	25																													
L 165+66	CL	25	26		143.90	143.93				1.2																					
L 165+66	CL	26		144.84																											
L 165+66	LT	26	27		144.00	144.35			19.2																						
L 165+66	LT	27		145.19																											
L 166+52	RT	28																											8.4		
L 166+61	LT	29																											9.6		
L 167+19	RT	30																											8.4		
L 167+52	LT	31	32		148.8	149.61				30.0																					
L 167+44	CL	32		151.43																											
L 167+46	RT	33																													
L 167+46	RT	33	34		150.24	150.3				4.8																					
L 167+56	RT	35																											7.2		
SHEET TOTALS									63.6	176.4	26.4								54						7.2		22.8		60		9.6

STATION	LOCATION	FROM	TO	ENDWALLS STD. 838.01, STD. 838.11 OR STD. 838.30 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.	QUANITIES FOR DRAINAGE STRUCTURES *TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') PER EACH (0 THRU 1.50)	METERS A 1.5 THRU 3.00	METERS B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND GRATE STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.20	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	CONCRETE APRON STD. 852.08	M.H. FRAME AND COVER STD. 840.54	BERM DRAINAGE OUTLET STD. 850.10	BERM DRAINAGE OUTLET STD. 850.11	375MM PARALLEL PIPE END SECTION	450MM PARALLEL PIPE END SECTION	450MM CROSS PIPE END SECTION	600MM CROSS PIPE END SECTION	750MM CROSS PIPE END SECTION	450MM CS PIPE CULVERT, 1.63MM THICK	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
L 158+51	RT	1				1														1															
L 158+51	RT	1	2																																
L 158+51	LT	3																														0.3			
L 158+51	LT	4				1											1		1																
L 158+51	CL	3	4																																
L 158+51	CL	4	5																															18.0	
L 159+45	CL	5				1										1			1																
L 159+45	LT	5	6																																
L 159+60	LT	6				1										1			1																
Y38 10+68	RT	7																																8.4	
L 161+39	RT	8	9																																
L 161+62	RT	9				1	0.47						1	1																					REMOVE EXISTING SYSTEM
L 161+62	RT	9	10																																
L 161+62	CL	10				1										1			1																
L 161+62	LT	10	11																																
L 161+62	LT	11				1										1			1																
L 162+79	RT	12																																17.0	
L 163+18	LT	13																							1										
L 163+18	LT	13	14																												1 @ 600				ROD & LUG W/ SLEEVE GASKETS
L 163+18	LT	14				1										1			1																
L 163+18	LT	14	15																																
L 163+18	CL	15				1										1			1																
L 163+18	RT	15	16																																
L 163+54	LT	17																																	
L 163+54	LT	18																																	
L 163+54	CL	18A																																6.0	
L 163+89	RT	19																																9.6	
L 164+39	LT	20				1										1			1																
L 164+39	LT	20	21																																
L 164+39	CL	21				1										1			1																
L 164+39	RT	21	22																																REMOVE EXISTING SYSTEM
L 165+66	RT	23	24																																
L 165+66	RT	24				1	0.40													1															CLEAN OUT EXISTING SYSTEM
L 165+66	CL	25																														0.3			
L 165+66	CL	25	26																																
L 165+66	CL	26				1											1		1																
L 165+66	LT	26	27																																
L 165+66	LT	27				1										1			1																
L 166+52	RT	28																																	
L 166+61	LT	29																																	
L 167+19	RT	30																																16.8	
L 167+52	LT	31	32																																
L 167+44	CL	32				1	0.32									1			1													0.3			
L 167+46	RT	33																														0.3			
L 167+46	RT	33	34																																
L 167+56	RT	35																																7.2	
SHEET TOTALS						15	1.19						1	1		10	2		12	2				1							1 @ 500	1.32		83.0	

ABBREVIATIONS

- C.B. CATCH BASIN
- N.D.I. NARROW DROP INLET
- D.I. DROP INLET
- M.D.I. MEDIAN DROP INLET
- M.D.I.(N.S.) MEDIAN DROP INLET (NARROW SLOT)
- J.B. JUNCTION BOX
- M.H. MANHOLE
- T.B.D.I. TRAFFIC BEARING DROP IN
- T.B.J.B. TRAFFIC BEARING JUNCTIC BOX